

## 1.1 lines, increments

## Increments

a. How can you drag point P or Q so that only  $\Delta x$  changes?

horiz.

b. How can you drag point P or Q so that only  $\Delta y$  changes?

vert.

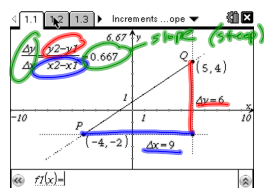
c. What are  $\Delta x$  and  $\Delta y$ ?

change in x, change in y

d. What is the equation of the line through P and Q?

$$y = \frac{2}{3}(x+4) - 2$$

$$y = \frac{2}{3}(x-5) + 4$$



## Definitions

Slope  $m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

Point-Slope Equation

$$y = m(x - x_1) + y_1$$

Slope-Intercept Equation

$$y = mx + b$$

General Linear Equation

$$AX + BY = C$$

Slopes of Parallel & Perpendicular lines

$$m_1 = m_2 \quad m_1 = -\frac{1}{m_2}$$

horizontal and vertical lines

$$m = 0$$

$$m = \text{undefined (no slope)}$$

dne  
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Write the point-slope equation for the line through (-2, -1) and (3, 4)

$$m = 1$$

$$y = (x - 3) + 4$$

or

$$y = (x + 2) - 1$$

Write an equation for the line through the point (-1, 2) that is (a) parallel, and (b) perpendicular to the line L:  $y = 3x - 4$

(a) slope same

$$y = 3(x + 1) + 2 \rightarrow y = 3x + 5$$

(b)  $y = -\frac{1}{3}(x + 1) + 2 \rightarrow y = -\frac{1}{3}x - \frac{1}{3} + 2$

slope =  $-\frac{1}{m}$   $y = -\frac{1}{3}x + \frac{5}{3}$

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Find the relationship between Fahrenheit and Celsius temperature. Then find the Celsius equivalent of 90 degrees Fahrenheit and the Fahrenheit equivalent of -5 degrees Celsius

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Regression: Starting with the data in the table, build a linear model for the growth of world population. Use the model to predict the population in the year 2010, 2015, 2020

Year	Pop
1980	4454
1985	4853
1990	5285
1995	5696
2003	6305
2004	6378
2005	6450

2015:  $79.957 \cdot 35 + 4466.48 = 7265$   
2020:  $79.957 \cdot 40 + 4466.48 = 7665$   
pop increases by 80 million people per year

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